CLINICAL CASE - TEST YOURSELF Vascular Imaging

An 81-year-old Female With Right Lumbar Pain And Persisting Fever

Ioanna Kanoupaki, Aikaterini Tavernaraki, Demetrios Exarhos
Department of CT & MRI, Evangelismos General Hospital, Athens, Greece

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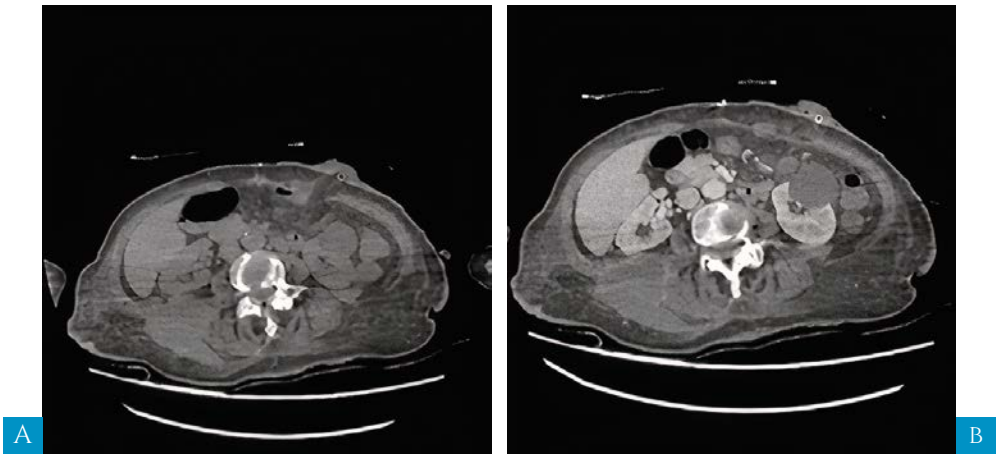
PART A

An 81-year-old female patient with a history of large bowel neoplasm and post-radiation colitis, along with pathological tissue in the orthosigmoid region and coccyx, revealed in a PET-CT scan, was hospitalized due to fever and organized collections depicted in a previous CT. These collections were communicating and they were located in the posterior peritoneal cavity, along the length of the right psoas muscle, in the subcutaneous tissue posterior to the right ischium, and in the presacral space. During her hospital stay, she presented with right flank pain, edema of the right gluteal region, and a new onset of persisting fever despite the antibiotics prescribed. There was clinical suspicion of enlargement of these collections and abscess formation. Thus, a new abdominal CT was ordered to plan a therapeutic paracentesis and percutaneous drainage of the suspected abscesses.



CORRESPONDING AUTHOR, GUARANTOR

MD, Radiology resident, Ioanna Kanoupaki
Email: kanoupaki.ioanna@gmail.com
Department of CT & MRI, Evangelismos General Hospital, Athens, Greece

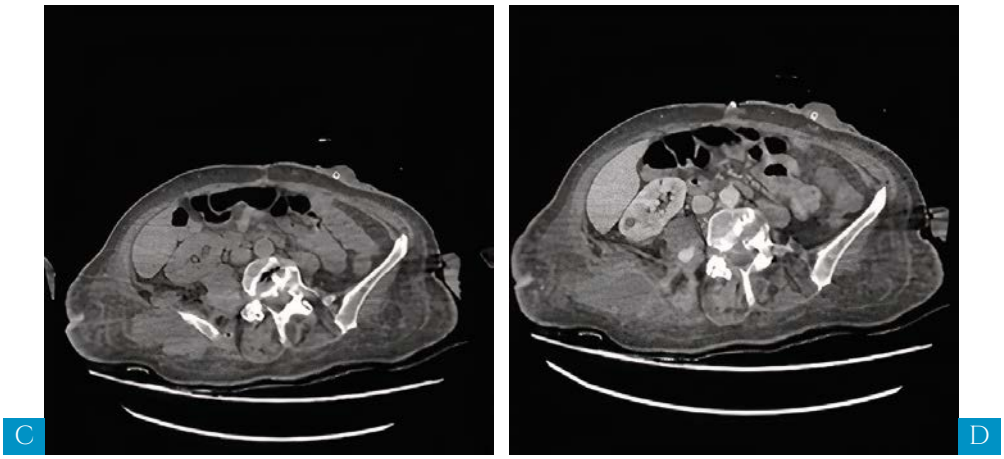


Image 1 a, b, c, d: *Abdominal CT*

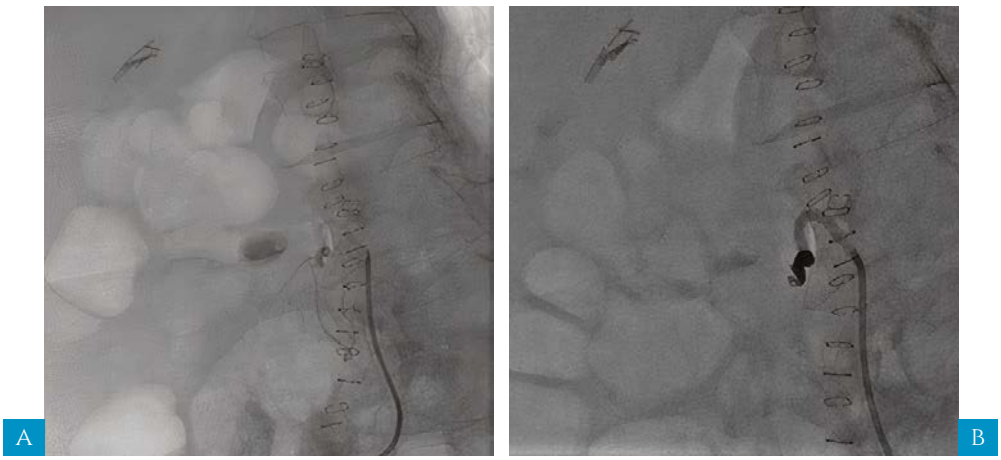


Image 2 a, b: *DSA*

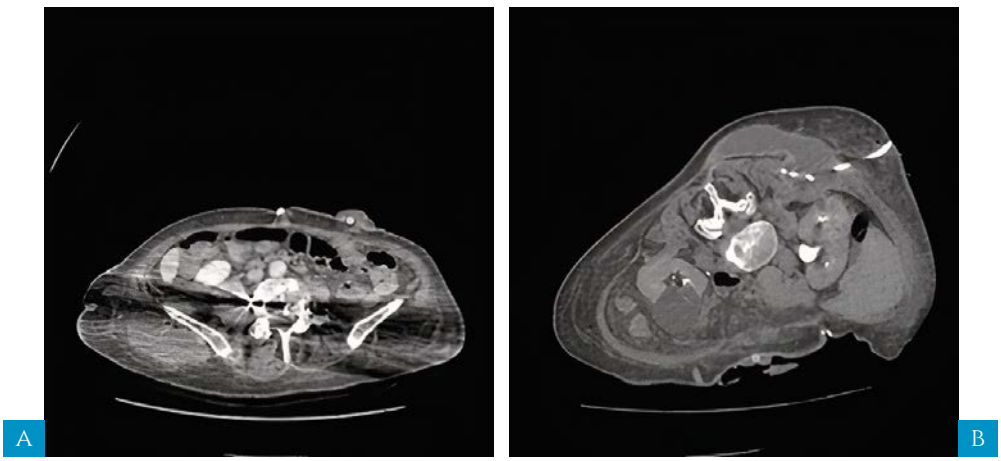


Image 3 a, b: *Abdominal CT*

PART B

Diagnosis: Mycotic lumbar artery aneurysm formation central to an iliopsoas abscess.

Lumbar artery aneurysms (LAA) are rare, nevertheless, their importance lies in the risk of rupture in the retroperitoneum and consequent hemorrhagic shock that constitutes an emergency [1,2,3,4]. Their symptomatology may be vague at times, leading to a delayed diagnosis and treatment, which may be fatal. However, diagnosis and treatment of symptomatic aneurysms, even when there is no clear threshold for their risk of rupture depending on their size or other features, should be sought promptly to decrease the morbidity and mortality of the patient [5].

Most of the lumbar artery aneurysms described in the literature are false aneurysms caused by traumatic or iatrogenic events, such as those after renal biopsies and spinal procedures [3,5,6]. There are also cases described in systemic diseases such as von Recklinghausen's disease and Menkes disease [3,4,5], and finally, one case of LAA due to necrotizing pancreatitis [1].

However, inflammatory processes also contribute to the formation of lumbar artery aneurysms [7]. Although the LAA inflammatory background has not been described extensively, there has been knowledge of the inflammatory processes concerning intracranial, visceral, and aortic aneurysms [8].

During these processes, there is vessel wall architecture destruction and fragmentation of elastic tissues, leading to weakening of the arterial wall [9]. These processes may be due to vascular remodeling in the sur-

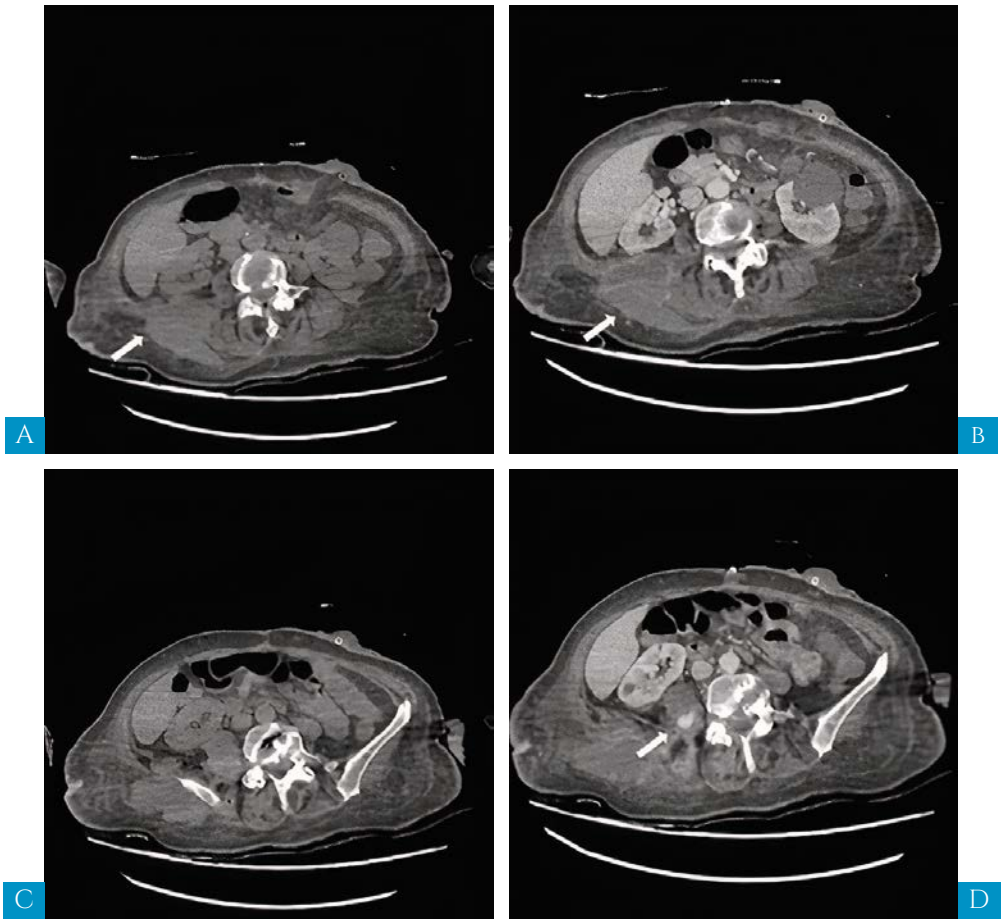


Image 1 a, b, c, d: *pre contrast and post contrast abdominal CT revealed the multiple collections in the retroperitoneal cavity and subcutaneous tissue, some of which were also clinically visible. However, an incidental finding was seen in the post contrast CT; a round, well circumscribed lesion of contrast attenuation in the right psoas muscle collection, corresponding to an aneurysm of the L4 lumbar artery.*

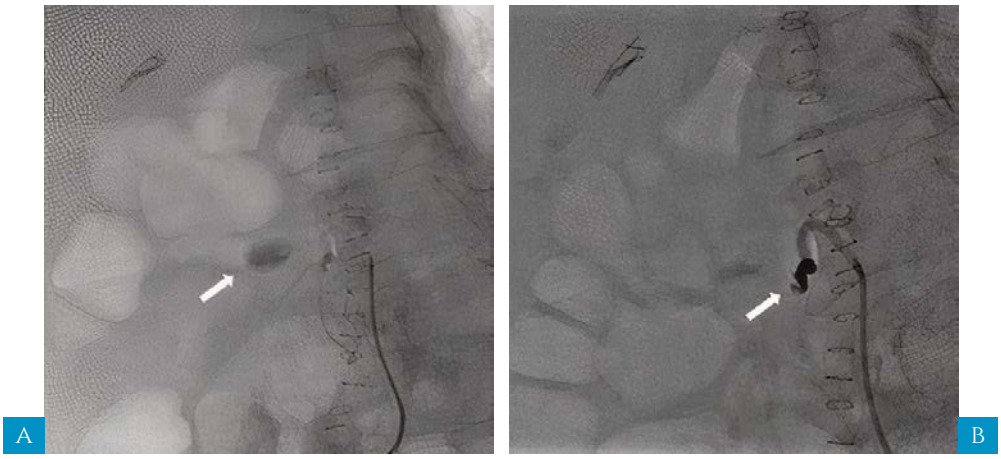


Image 2 a, b: *DSA performed during the selective catheterization and endovascular embolization of the LAA with microcoils by the division of interventional radiology. A post-embolization contrast injection reveals total exclusion of the L4 artery and its aneurysmal sac.*

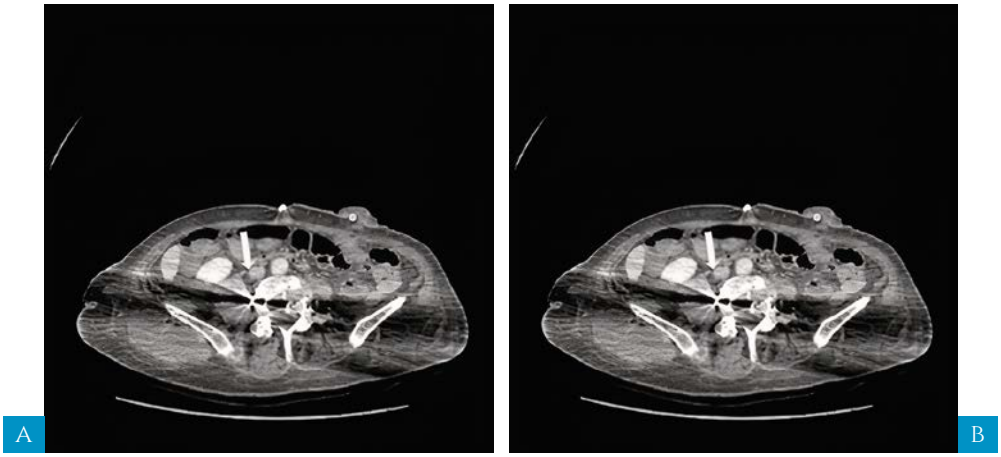


Image 3 a, b: *post contrast CT performed 2 weeks later in which the embolization material is seen. The collections are liquefying due to central necrosis and there is also peripheral enhancement, findings that are associated with abscesses that were drained with CT guided percutaneous drainage.*

rounding tissues caused by a cascade of inflammatory cells such as neutrophils, attracting molecules like matrix proteinases and activating various apoptotic mechanisms [8]. Some studies suggest that the degree of metalloproteinase activity is related to the risk of aneurysmal rupture [10].

The term mycotic aneurysm has been described for dilatation of an arterial wall due to an infectious process, either systemic with presence of bacteremia or septic emboli, due to vascular injury with bacterial inoculation at the site, or even because of direct local bacterial spread [9,10,11,12].

Although the term mycotic may be confusing, it still refers to all infected aneurysms by bacterial and fungal agents [11,12]. In aneurysms found in visceral vessels, it has been suggested that the infected ones have a higher

predisposition to rapid expansion and rupture because of the progression of the underlying process [9,12].

Concerning inflammatory AAA, for example, they can develop because of infection or inflammation that encompasses the vessel, destroying its wall and leading to its dilatation, but there are differences observed. When there is an infectious agent, they tend to be saccular in shape, with rapid growth and a greater tendency of rupture, while with no underlying infection, aneurysms are fusiform, with a lower risk of rupture [13].

Depending on the source of the infectious agent, the process of aneurysmal formation is distinct; either through direct penetration through trauma or surrounding infection and necrosis of its wall with false aneurysmal formation, or through colonizing a preexisting aneurysm or atherosclerotic plaque intraluminally [11,12]. Similar mechanisms of formation can be hypothesized for LAA, although not described.

Moreover, there has been evidence of radiation-induced vasculopathy as well as other vascular wall changes and radiation-induced intracerebral aneurysmal formation [14]. Again, endothelial injury is hypothesized as the underlying mechanism, with some authors reporting fibrosis, necrosis, atherosclerosis, and inflammation of the vascular wall affecting the media and intima layers [14]. Concerning radiation-induced intracranial aneurysms, it has been proposed that they are more fragile, with significantly higher rupture rates [4].

Nevertheless, there have been reports that pelvic radiation has an opposite effect on AAA, decreasing their incidence, with no evidence whatsoever on its etiology and mechanisms [13]. There is no doubt that radiation-induced abdominal aneurysms are an extremely rare phenomenon that should, however, be studied further and cannot be completely excluded.

Concerning the LAA diagnosis, unless there is a large intraperitoneal hematoma, it is difficult to suspect, and even then, impossible to depict an aneurysmal sac of small size by ultrasound alone. CT pre and post iv contrast is the method of choice, with arterial, venous, and delayed phases to best demonstrate the aneurysmal sac [5].

Since CT is readily available, non-operator dependent, and demonstrates in detail the aortic branches, its sensitivity and specificity for detecting lumbar pseudoaneurysms are high [5,12]. An enhanced CT is useful not only for depicting the vascular lesion itself, but also its feeding vessels and therefore to plan the therapeutic approach [2,10,15]. MRA is also a diagnostic approach that has high sensitivity for vascular lesions [15]; however, it is not readily available in all centers, it is more time-consuming, and of higher cost than a CT scan [10]. It can be an option, however, in cases where CT is contraindicated due to the radiation (pregnancy), or in cases where no iv contrast can be administered (AKI), since MRI can demonstrate vascular lesions without the administration of contrast with specific sequences [16].

DSA is a very precise diagnostic tool, and it is combined with endovascular therapeutic measures of the said aneurysm, but at the same time, DSA is still an invasive technique with the risks that this entails [15].

While there have been guidelines described for the therapeutic approaches of visceral aneurysms, size >2cm, symptomatic aneurysms, and rupture of the aneurysm being the most important of them, there have not been clear guidelines for LAA therapeutic approaches. Endovascular transarterial embolization is the treatment option mostly described in the literature because of the low accessibility position of the LAAs, narrow operating field of view, higher risk of bleeding, need for general anesthesia, and longer hospital stay associated with open surgery [2,3,5,6,9,12,15].

There are complications and risks associated with catheter angiography and embolization, such as arterial puncture, muscle or peripheral nerve infarction, and spinal cord infarction [2]; however, with hyperelective catheterization, these are minimal [15].

We present a rare case of LAA formation, found incidentally, central to an abscess located along the right psoas muscle. No other such case, where the inflammatory/infectious process is directly encircling a lumbar artery before the destruction of its wall, has been described in our knowledge. Since the LAA was an incidental find-

KEY WORDS Mycotic aneurysm,Abcess,CT

ing while investigating abscesses formation, only the venous phase was performed, which was adequate for its demonstration. It is of high importance to stress the significance of iv contrast administration before any interventional procedure to detect similar unknown vascular lesions or aberrant vessels in the area of interest that could complicate the procedure [6].

The department of interventional radiology performed a DSA, which identified a saccular LAA, with no active extravasation of contrast at the time. Hyperselective embolization with metallic microcoils was performed, and the aneurysmal sac was successfully excluded. The next day a new CT scan was performed for drainage of the collections. Lab results from the specimens' culture revealed Pseudomonas aeruginosa and Enterococcus species, for which the patient was treated with appropriate antibiotic treatment.

One month later, when a follow-up CT was performed, the collection that was drained previously was no longer visible, however, the presacral collection with which it was communicating via the obturator foramen was still present with smaller dimensions. **R**

Conflict of Interest

The authors declared no conflicts of interest.

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